

I. Listing of Claims

1. (Currently Amended) A system for estimating body states of a vehicle comprising:

a first linear accelerometer and a second linear accelerometer mounted to the vehicle in separate locations from each other, the first and second linear accelerometers being configured to measure the acceleration of the vehicle in a first direction and generate measured vehicle state signals based on the acceleration of the vehicle in the first direction;

a third linear accelerometer and a fourth linear accelerometer mounted to the vehicle in separate locations from each other, the third and fourth linear accelerometers being configured to measure the acceleration of the vehicle in a second direction and generate measured vehicle state signals based on the acceleration of the vehicle in the second direction, wherein the second direction is different from the first direction;

a signal adjuster configured to transform the measured vehicle state signals from a sensor coordinate system to a body coordinate system associated with the vehicle; and

a filter configured to receive the transformed measured signals from the signal adjuster and process the measured signals into body state estimates of the vehicle, wherein the body state estimates include at least one of a roll rate, a roll angle and a yaw rate.

2. (Previously Presented) The system of claim 1 wherein the filter includes a model of the vehicle dynamics and a model of the linear accelerometers, the state estimates being based on the transformed measured signals and the models of the vehicle dynamics and linear accelerometers.

3. (Previously Presented) The system of claim 1 wherein the filter includes an estimator, an algorithm being implemented in the estimator to process the transformed measured signals and the models of the vehicle dynamics and linear accelerometers and generate the state estimates.

4. (Canceled)

5. (Previously Presented) The system of claim 1 further comprising an angular rate sensor.

6. (Canceled)

7. (Currently Amended) The system of claim 1 further comprising two linear accelerometers that measure accelerations in a third direction, wherein the third direction is different from the first and second directions.

8. (Canceled)

9. (Previously Presented) The system of claim 1 further comprising two linear accelerometers that measure the vertical accelerations of the vehicle.

10. (Original) The system of claim 1 wherein the state estimates relate to the vehicle's lateral velocity, yaw rate, roll angle, and roll rate.

11. (Previously Presented) The system of claim 1 wherein the signal adjuster further provides compensation for gravity biases associated with the linear accelerometers.

12. (Withdrawn) A method for estimating body states of a vehicle comprising:

generating measured vehicle state signals corresponding to the acceleration of the vehicle in a first direction with a first linear accelerometer and a second linear accelerometer set;

generating measured vehicle state signals corresponding to the acceleration of the vehicle in a second direction with a third linear accelerometer and a fourth linear accelerometer;

transforming the measured vehicle states signals from a sensor coordinate system to a body coordinate system associated with the vehicle; and

processing the measured signals into body state estimates of the vehicle, the body state estimates include at least of one a roll rate, a roll angle and a yaw rate.

13. (Withdrawn) The method of claim 12 system of claim 1 wherein the processing includes modeling the vehicle dynamics and the linear accelerometers.

14. (Canceled)

15. (Canceled)

16. (Withdrawn) The method of claim 12 wherein the state estimates relate to the vehicle's lateral velocity, yaw rate, roll angle, and roll rate.

17. (Withdrawn) The method of claim 12 wherein the transforming includes providing compensation for gravity biases associated with the linear accelerometers.